C. Remarks

In the office action, claims 1-11, 21 and 23-25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,137,364 (McCarthy I) in view of U.S. Patent No. 6,534,794 (Nakanishi), and claim 22 is rejected under 35 U.S.C. § 103(a) as being unpatentable over McCarthy I in view of Nakanishi and in further view of U.S. Patent No. 5,838,451 (McCarthy II). Applicant respectively traverses the rejections as follows.

§ 103(a) Rejections

Applicant has amended claim 1 to recite a color measurement instrument that includes:

> illuminator means for illuminating a sample, wherein said illuminator means is mounted to a first substrate and defines an axis of illumination;
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> color measurement means for measuring light reflected from said sample, wherein said color measurement means is mounted to a second substrate and defines an axis of detection, wherein the second substrate is physically separated from the first substrate, and wherein the axis of detection intersects the axis of illumination to form a non-zero angle;
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> a temperature changing element for changing a temperature of said illuminator means;
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> temperature sensing means for sensing the temperature of said illuminator means; and
>
> control means responsive to said temperature sensing means for controlling said temperature changing element such that the temperature of said illuminator means is maintained substantially equal to a target temperature that is greater than an ambient operating temperature of the instrument.

Applicant submits that support for this amendment is found throughout the specification and figures as filed. With respect to the "second substrate," Applicant submits one skilled in the art would recognize that this feature is necessarily inherent because the first stage 40 circuit (FIG. 11) is contained within the sensor system 16 (FIG. 3), and the illumination package 20 circuit (FIGS. 4-6) is separately contained within the illumination system 14 (FIG. 3). *See* MPEP § 2163.01-02.

A *prima facie* case of obviousness under 35 U.S.C. § 103(a) requires some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *See* MPEP §2142. A *prima facie* case of obviousness further requires that the prior art references teach or suggest all the claim limitations. *Id.* For at least the following reasons, Applicant submits that at least the second criterion is not satisfied by the cited combination of McCarthy I and Nakanishi with respect to claim 1.

McCarthy I discloses a light measurement assembly including a set of emitters 2 (LED dice) and detectors 3. The emitters 2 are arranged around the circumference of the assembly, and the detectors 3 are centered thereon. *See* FIG. 1A and col. 4, ll. 18-35. The emitters 2 and detectors 3 are mounted on a common substrate 7 for providing a thermal connection therebetween. *See* FIG. 1A, col. 3, ll. 20-37, and col. 4, ll. 18-35. The assembly optionally includes a thermal sensing element 8 and a heating and cooling system 9. *See id.* The output of the thermal sensing element 8 is used to adjust linear transformations between weighted integrations and reported output units. *See id.* The heating and cooling system 9 functions to maintain the emitters 2 and the

detectors 3 at a constant temperature during temperature stabilization. See col. 5, ll. 8-14.

Nakanishi discloses a semi-conductor light-emitting unit 41A including a semi-conductor laser diode 1, a sub-mount 2, a mount 3, and a photodetector 6. *See* FIG. 1 and col. 5, ll. 58 - col. 6, ll. 2. The laser diode 1 is mounted to the sub-mount 2, which is in turn placed on a side face of the mount 3, and the photodetector 6 is placed on the upper surface of the mount 3. *See id.* The unit 41A further includes a heating region 81 that is activated when the ambient temperature is lower than the temperature at which kinks are formed in the I-L characteristic (FIG. 12) of the laser diode 1. *See* col. 6, ll. 26-60. Heat transferred from the heating region 81 to the laser diode 1 allows the laser diode 1 to be operated within the linear (*i.e.*, "kink-free") region of its I-L characteristic.

First, Applicant submits that McCarthy I fails to disclose, among other things,

> illuminator means for illuminating a sample, wherein said illuminator means is mounted to a first substrate and defines an axis of illumination; and
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> color measurement means for measuring light reflected from said sample, wherein said color measurement means is mounted to a second substrate and defines an axis of detection, wherein the second substrate is physically separated from the first substrate, and wherein the axis of detection intersects the axis of illumination to form a non-zero angle,

as recited in claim 1. To the contrary and as noted above, McCarthy I clearly discloses that the emitters 2 and detectors 3 (identified as equivalent to claimed "illuminator means" and "color measurement means," respectively) are mounted to a common planar substrate 7 in order to establish thermal communication therebetween. As a consequence of this mounting arrangement, the illumination and detection axes of the

emitters 2 and detectors 3, respectively, are necessarily parallel and cannot intersect to form a non-zero angle as recited in claim 1. The design disclosed by McCarthy I is thus limited to non-standard optical geometries and, unlike the arrangement of the present invention, cannot be used to create industry standard optical geometries, such as, for example, 45°/0° and diffuse sphere integrator geometries.

Nakanishi similarly fails to disclose the claimed arrangement of the illuminator means and the color measurement means. In particular, insofar as the sub-mount 2 and the mount 3 to which the laser diode 1 and the photodetector 6 are respectively attached might be viewed as different substrates, the sub-mount 2 and the mount 3 are not physically separated as are the first and second substrates of claim 1. Additionally, Nakanishi fails to disclose that the illumination and detection axes of the laser diode 1 and the photodetector 6, respectively, intersect to form a non-zero angle, as the light-emitting face of the laser diode 1 and the light-receiving face of the photodetector 6 are co-planar. *See, e.g.*, FIGS. 1, 5, 8 and 9 and col. 6, ll. 18-25. As a result, the design disclosed by Nakanishi is also limited to non-standard optical geometries.

Second, Applicant submits that McCarthy I also fails to disclose

> control means responsive to said temperature sensing means for controlling said temperature changing element such that the temperature of said illuminator means is maintained substantially equal to a target temperature that is greater than an ambient operating temperature of the instrument,

as further recited in claim 1. The Examiner contends that the computer disclosed by McCarthy in FIG. 1 (identified as equivalent to claimed "control means") is responsive to the thermal sensing element 8 (identified as equivalent to claimed "temperature sensing means") for controlling the temperature changing means to control the temperature of

the emitters 2 (identified as equivalent to claimed "illuminator means"). Applicant respectfully disagrees. In particular, the output of the thermal sensing element 8 is not used by the computer to control substrate temperature, but rather is used to adjust linear transformations between weighted integrations and reported output units. *See* col. 3, ll. 29-33 and col. 6 ll. 10-17. In other words, the thermal sensing element 8 output is used by the computer to adjust photometric data.

Additionally, McCarthy I nowhere discloses that the computer functions to control the temperature of the emitters 2 "substantially equal to a target temperature that is greater than an ambient operating temperature of the instrument," as recited in claim 1. Although McCarthy discloses a temperature stabilization mode in which the emitters 2 and detectors 3 are maintained at a uniform temperature by the heating/cooling system 9 (col. 5, ll. 15-20), McCarthy does not disclose any relationship between the temperature generated by the heating/cooling system 9 and an ambient operating temperature of the assembly.

Applicant further submits that Nakanishi also fails to disclose the claimed "control means." In particular, although Nakanishi discloses in FIG. 11 that a control circuit 103 controls a heating circuit 104 responsive to a temperature measuring circuit 102, the temperature control scheme employed by Nakanishi does not function to maintain the temperature of the laser diode 1 "substantially equal to a target temperature that is greater than an ambient operating temperature of the instrument." Rather, Nakanishi discloses that the heating circuit 104 is energized only when the ambient temperature is such that kinks are formed in the low temperature I-L characteristic (FIG. 12) of the

laser diode 1. Accordingly, Nakanishi permits the laser diode 1 temperature to fluctuate as long as the I-L characteristic remains sufficiently linear.

Third, Applicant agrees with the Examiner insofar as McCarthy I fails to disclose the "temperature changing element" feature recited in claim 1. The Examiner contends, however, that it would be obvious to one skilled in the art to modify McCarthy I to include the heating region 81 of Nakanishi. Even if McCarthy I could be modified in the manner proposed, Nakanishi still fails to remedy the above-described defects of McCarthy I with respect to claim 1.

For at least the above reasons, Applicant submits that claim 1, as well as claims 2-4 depending therefrom, are nonobvious over McCarthy I or Nakanishi, either alone or in combination. *See* MPEP §2143.03 (stating that if an independent claim is nonobvious under §103(a), then any claim depending therefrom is nonobvious).

Applicant has amended claim 5 and claim 9 in a manner analogous to that of claim 1. Claim 11 has been amended to conform to the amendment of its base claim, claim 9, and to correct a minor antecedent basis error. For the reasons set forth above, Applicant submits that claims 5 and 9, as well as claims 6-8 and 10-11 depending therefrom, respectively, are not rendered obvious by McCarthy I or Nakanishi.

Applicant has amended claim 21 to recite a color measurement instrument that includes:

> a temperature sensor in thermal communication with an illuminator substrate;
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> a heating element in thermal communication with the illuminator substrate;
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> a temperature-sensitive illuminator in thermal communication with the illuminator substrate;

a temperature controller coupled to the temperature sensor and the heating element; and

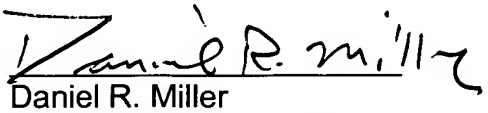
a light-sensing device mounted to a sensor substrate.

For reasons analogous to those cited above with respect to claim 1, Applicant submits that claim 21, as well as claims 22-25 depending therefrom, are not rendered obvious by McCarthy I or Nakanishi.

D. Conclusion

Applicant respectfully requests a Notice of Allowance for the pending claims in the present application. If the Examiner is of the opinion that the present application is in condition for disposition other than allowance, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below in order that the Examiner's concerns may be expeditiously addressed.

Respectfully submitted,



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